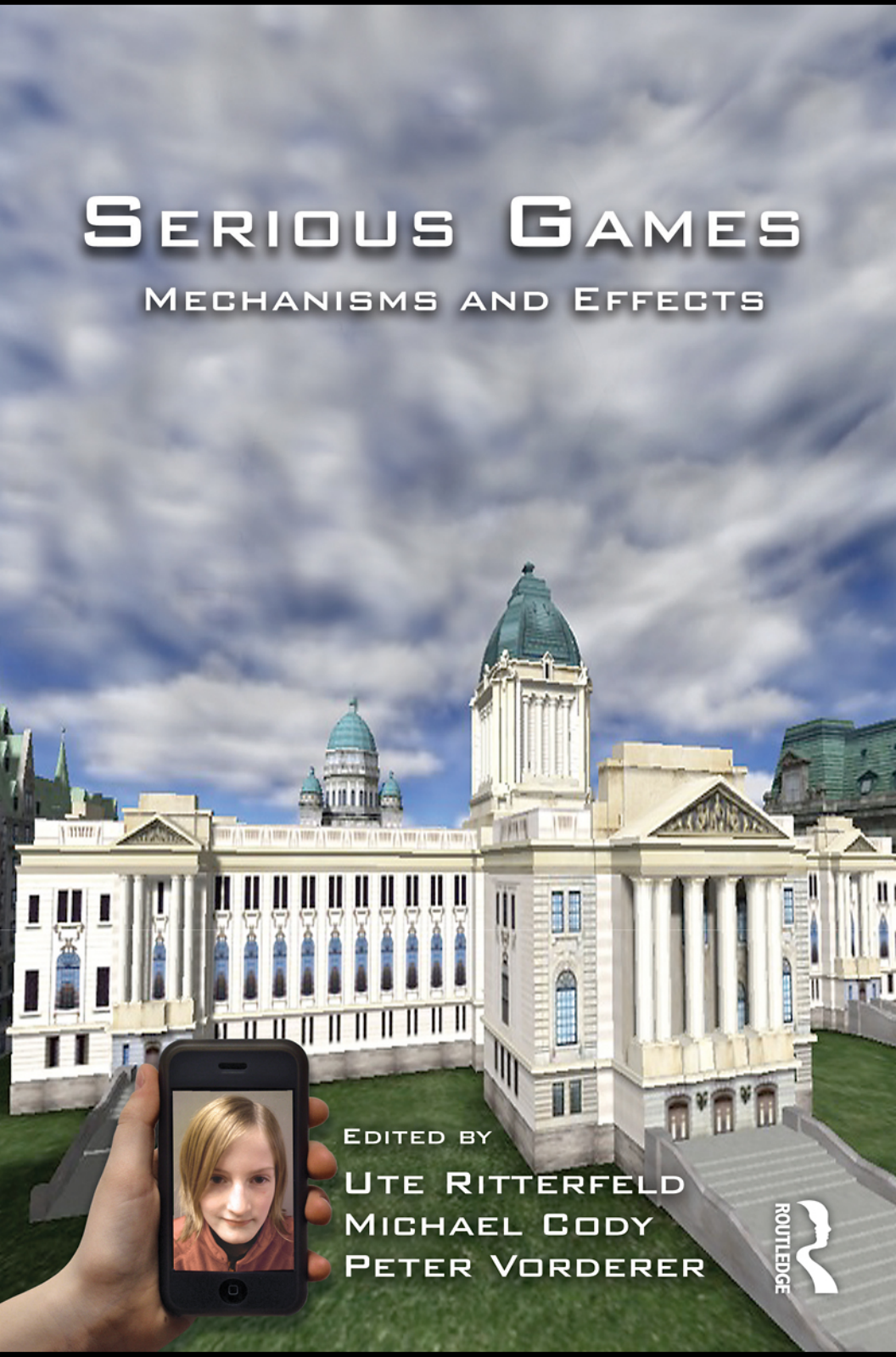
# Serious Games

## Mechanisms and Effects



Edited by
Ute Ritterfeld
Michael Cody
Peter Vorderer

Routledge

# Serious Games

*Serious Games* provides a thorough exploration of the claim that playing games can facilitate learning that is deep, sustained and transferable to the real world. Contributors investigate the psychological mechanisms that take place not only during gaming, but also in game selection, persistent play, and gaming impact. Focusing on the desirable outcomes of digital game play, the volume editors distinguish between three possible effects—learning, development, and change. Contributions from internationally recognized scholars focus on five objectives:

- Define the area of serious games
- Elaborate on the underlying theories that explain suggested psychological mechanisms elicited through serious game play, addressing cognitive, affective and social processes
- Summarize the empirical evidence on the effectiveness of serious games
- Introduce innovative research methods as a response to methodological challenges imposed through interactive media
- Discuss the possibilities and limitations of selected applications for educational purposes.

Anchored primarily in social science research, the approaches included here emphasize the gaming process and the users' experiences. Additional perspectives, written from non-social science approaches by experts in academic game design and representatives of the gaming industry, conclude the volume.

This timely and singular work will appeal to scholars, researchers, and graduate students working in media entertainment and game studies in the areas of education, media, communication, and psychology. It sets a benchmark for serious games research, and will influence work in this area in the years ahead.

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To Geoffrey Cowan,
A great visionary and supporter of games research

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# Foreword: From *Virtual U* to Serious Games to Something Bigger

In 1999 I got a phone call that changed my life. On the other end of the call was a foundation program manager that I would learn right away doesn't take no for an answer. Jesse Ausubel of the Alfred P. Sloan Foundation chases big ideas. Aside from counting all the fish in the world with the Census of Marine Life project (http://www.coml.org), in 1999 Ausubel was working with former Stanford CFO William Massy and the game developer of *Capitalism I* and *II* Trevor Chan to develop a *Sim-City* styled simulation of universities which we would later title *Virtual U*.

Jesse told me that I would be on a plane the next day to visit the foundation and discuss how to finish the game, get it tested, and distributed to market. Despite my sense that getting a plane flight the next morning was sort of short notice, there I was on the plane flight from Portland, Maine to New York City that next morning wondering what I was about to get myself into. It was an eventful meeting and for the next 3 years *Virtual U* was a big part of my life. Given the part *VU* played in my life, it still is.

What *Virtual U* was to be was a method to explore a critical issue of management; namely, the effort to get people to manage complex systems more discretely as a sum of their most important parts and to infuse that system's culture throughout the organization thus breaking down the inevitable fiefdoms and blinders that inhibit how organizations function. The goal of course was to do this specifically for universities, which as organizations, are legendary for operating with a pervasive sense of parochial activity. I'm sure for many of the academic readers of this book I'm not providing you with breaking news. For the Sloan Foundation, to improve the management of the nation's universities was a leveraged means of improving all aspects of a university's output and it is an overall program that certainly has its roots in the foundation's namesake's career. Ausubel spoke about this in the context of *Virtual U* at an event held at MIT where we looked back on its early history:

> The story begins on a spring day in 1995 in Palo Alto. I was visiting Bill Massy, then a professor at Stanford. Bill was analyzing why graduate students took ever longer to obtain doctoral degrees. Managing the Sloan

> Foundation's program on "the university as a system," I was concerned not only about specific problems such as the 9 years doctoral students averaged to acquire degrees but also about how the many problems connected to one another. The university was a jangly torso, in which the hip bone connected loosely to the thigh bone, and on down to the big toe. But no one seemed to have a working model of cause and effect. Indeed, perspectives on the university seemed to show it as all muscular thighs, all deft fingers, or a thick skull. I wanted a crude look at the whole.

There are many ways to improve university management and leadership. Books, conferences, films, and other methods were past, present, and future methods that were well known and utilized by the foundation. This time, however, the goal was to try something new, something that might move beyond the typical approaches, notions of audience, and baseline capability of other media efforts. Both Massy and Ausubel were on a collision course with an interesting bit of serendipity.

> So, after hearing Bill's impressive analysis of the time required to reach a degree, I inquired, what would you really like to do? After a couple of tentative starts, Bill's eyes lit, exclamations began, and he ran to a file cabinet and pulled out a memo he had written some months earlier proposing to build an interactive video game of the U.S. University. I said, yes, yes, and we shook hands. The idea for a game-based approach wasn't so automatic though. There was an unique link of inspiration and history that further catalyzed faith in project's birth and approach.
>
> Back in the mid-1980s I had edited a book on Cities and Their Vital Systems. Shortly after the book appeared, a call came from California in a very youthful voice, asking, "Hey, I am trying to build a game about building and managing a city. Would you mind if I draw on some of the ideas in your book?" A few weeks later a beta version of SimCity arrived in the mail for testing. The voice was that of Will Wright, the genius of simulation games, and the rest is history.

Looking back now it's interesting to see the intertwined paths of Wright and Ausubel, neither of whom attempt small projects. Both were interested in the unique systemic volume of urban life and now as Wright launches *Spore*, a game that is a simulation of digital life, Ausubel is finishing up a project of similar scale that is attempting to catalog all the unique (and often Spore-creature-like life) of the world's oceans. And if you ask me both Wright and Ausubel played big parts in establishing what many now call serious games. All of these series of anecdotal events and observations speak to the fact that the world of serious games and commercial entertainment games are inexorably linked.

The experience of *Virtual U* was at first unique: at the time we didn't call what we were doing serious games. It was just a game-based simulation. We did worry about the use of the word *game* then, an idea today I find ever more absurd. Our goal, simply, was to make it as good a game as possible, learn from our mistakes, and survive long enough to get a sequel out. Improving the software was my most important goal because frankly the first version of *Virtual U* wasn't that great.

Our biggest mistake was that the game had been designed to be a simulation of an "up and running" university whose growth and change state was measured by graphs and numbers and not by the idea that you built it from scratch. Regardless of the structure of the change state (i.e., what the player had achieved by playing), we also had a game that was poor at relating the picture of the journey the gamer had taken. What we heard most of all from its most important users was that the game had trouble working in a classroom environment (brick or distance) and that as a tool for teaching it needed some improvement. With some further funding from Sloan we were able to improve on some of these problems and others. Today the product is decent but still suffers, aside from age, from some of the structural approaches that were too big to overcome. However, what we did learn in going from launching the game and moving it from version 1.0 to 2.0 was a tremendous amount of nearly life lessons that still infuse my thinking concerning serious games and as a game designer today. I've often said that for all its success in providing a disruptive approach to exploring notions of university management and leadership, *Virtual U* will historically be remembered more for its contribution to the growth of serious games. The transition from *Virtual U* to serious games was catalyzed again by Jesse Ausubel.

In 2002, David Rejeski from the Woodrow Wilson Center for Scholars, influenced by watching his son play *Age of Empires* (*AoE*), was looking to explore the use of videogames for government policy planning. His Foresight in Governance Project at Wilson was charged with improving long-term government planning practices. Rejeski felt the way games such as *AoE* and *SimCity* gave players a much more epic frame of reference and accessible interface that might prove useful for engaging policy makers, and the public at-large in bigger discussions about policies that sometimes take years to show their true effects (good or bad). Having heard of *Virtual U*, Rejeski reached out to Ausubel (whom he had known previously) and as a result I got another eventful phone call.

Rejeski and I agreed that what we needed to do first was explain the notion of why games could help the space of government simulations (at the time we were still thinking mostly about policy simulations) and that in doing so we'd be able to cheaply plant the seed that might lead to further funding and work. I worked on the idea for a couple of months and produced a paper, which I titled "Improving Public Policy through Game-Based Learning and Simulation." I

felt it was suitably government sounding. Dave wanted it to have a bit more punch so, influenced by Clark Abt's book *Serious Games*, he added that term as a precursor to the title of the document. I only know this because I remember seeing the book in Dave's office one day. So that's the origin of the term *Serious Games* as used so fluently in the videogames industry today.

The paper was a modest hit. What we learned most of all from that, and from the *Virtual U* experience was that there were many more people pursuing the ideas we encapsulated in the serious games paper. What frustrated us, however, was that this network of pioneers had no real nexus. Without such a nexus there wasn't much of a way to organize and move forward on the specific ideas we had for government policy games.

With further help from Ausubel via the Richard A. Lounsbery Foundation we were able to begin hosting a series of topical meetings and travel to other meetings to expand on the idea of serious games. We also engaged in writing further articles and promoting the idea via press releases and general grassroots organizing. We called this effort the "Serious Games Initiative." The mere existence of this highly virtual effort served to add some nexus and through use of our e-mail discussion list and recruiting efforts a viable network of professionals began to emerge in unison and it was this group of connections that enabled more to happen quickly, including the birth of the Serious Games Summits and the creation of "The Games for Health" project.

As these new projects took hold I found myself traveling the country and other parts of the world expounding on an idea that had already taken root. Serious games wasn't birthed by *Virtual U* or *America's Army* or The Serious Games Initiative. To me it was clearly given its life by the amazing ascendancy of tools, techniques, talent, and tradecraft of the videogame development industry. There would be no serious games space as we define it today if the games industry's technical, cultural, and business growth hadn't been so meteoric in the last 10 to 15 years.

While we could dwell on certain aspects of games that drove the growth of serious games (e.g., the creation of real-time synchronous first-person 3D graphics engines) the key underlying current was that games were more rapidly taking advantage of what Moore's Law and Metcalfe's Law were doing on a fundamental technology level. As games mined the gap between the tops of these curves and traditional information technology companies, they increasingly created a disparity that prescient people began to try to exploit. That much of this prescience took place in academia certainly contributed to the focus on learning outcomes from games. However as Dave and I grew the Initiative and its network we soon realized that the use of games beyond entertainment was way beyond the scope of policy making, or learning.

Despite the efforts to widen people's eyes to the outlets for games and their related resources, the more I worked on the idea of serious games the more I realized that too much of the space resembled the story of the blind men and the elephant as recounted in the poem by John Godfrey Saxe. As the story

goes six blind men examine different parts of an elephant and by virtue of their physical impairment cannot see the whole from its parts. By virtue of their mental impairment they then argue incessantly as to the elephant's true description:

> And so these men of Indostan
> Disputed loud and long,
> Each in his own opinion
> Exceeding stiff and strong,
> Though each was partly in the right,
> And all were in the wrong!

Too many people who work within, and study the notion of serious games are themselves casting too narrow a net. The worst case of all is the notion of games for learning, because despite it being the most prevalent use, the very proponents of this use have often succeeded in leaving many audiences for their work as equating serious games *only* as games for learning. As someone who has been deeply immersed in the serious games space, I can see the danger of allowing this shortsightedness to corrupt the very space of serious games, and in doing so we will destroy the ultimate potential of games beyond entertainment.

As leaders of a new emerging practice that we collectively call serious games (for lack of any other better label) we bear responsibility for ensuring that the descriptions we use and adhere to paint the entire picture of what serious games represents. Too often serious games is defined by the speaker or writer as "that which they do" and that is the very essence of narrowcasting, let alone quasi-snobbery. And as we argue the meaning and effectiveness and philosophy of games for learning we are swept into the tsunami of debate that permeates the general field of education. Again I am inspired by Saxe's words:

> So oft in theologic wars,
> The disputants, I ween,
> Rail on in utter ignorance
> Of what each other mean,
> And prate about an Elephant
> Not one of them has seen!

My journey in serious games is intensely personal. I've been playing games since pong and I can still remember so many large segments of my life devoted to games (I wrote my high-school economics paper on the games industry, describing ideas like affiliated developer agreements, distribution, and market segments that my teacher then called fascinating, which I think had more to do with the novel subject matter than the likely numerous spelling mistakes). What it has mostly been about, however, is a constant series of networked

experiences and behind each of those experiences was the pervasive notion that games have and can be much more than what they have achieved at the present time. Serious games are a product of that sentiment (as are many other ideas like casual games, ARGs, Guitar Hero, machinima, and more) and for me that is the most special aspect to all of this.

I *love* games. I love the creativity, I love the software development challenges, I love the dynamics of the industry, I love that I live at both its dawn and perhaps several "golden age" cycles. As such I am heartened to know that games, serious games, can be applicable to so many aspects of life. It is amazing to turn the corner in my work and see some use for games that I had not even imagined before. Ideas like helping people overcome phobias, increasing productivity at work by the very virtue of doing their work inside a game, and changing our own biology as a result of exposed gameplay.

Assembled in the book are some great pieces of thought and work on serious games. However, if there is a warning that must prelude the fine work here, it is that this is but the tip of the iceberg and that it focuses predominantly on the educational power of games. I know many of the authors, and they are not all blind to the wider power and opportunities of games. However, you as a reader need to know that my own idea of serious games started out with my own blind senses and now, almost 10 years later, thanks to a wide and personal journey with games and many different walks of life I've managed to remove my own blindfolds and when I did I discovered a world that goes well beyond where it is now.

But you have to start somewhere and this wonderful collection of work is part of that. For me I will always remember it started as that phone call in the fall of 1999.

*Ben Sawyer*

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**Ute Ritterfeld,** Professor of Media Psychology, received her education in the Health Sciences (Academy of Rehabilitation in Heidelberg) and in Psychology (University of Heidelberg), completed her PhD in Psychology (Technical University of Berlin), and habilitated at the University of Magdeburg, Germany. She was Assistant Professor at the University of Magdeburg, Adjunct Professor at the Universities of Berlin (Humboldt) and Hannover, and Associate Professor at the University of Southern California (USC) in Los Angeles, Annenberg School for Communication. At USC, Ritterfeld directed an interdisciplinary research team devoted to the studies of digital games and hosted the inaugural academic conference on serious games. In 2007, Ritterfeld joined the faculty of Psychology and Education at the VU University Amsterdam and co-founded the Center for Advanced Media Research Amsterdam (CAMeRA@VU) where she serves as director of interdisciplinary research. Ritterfeld co-edits the *Journal of Media Psychology* published by Hogrefe.

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Part I

# Serious Games

## Explication of an Oxymoron

Chapter 1

# Introduction

*Ute Ritterfeld, Michael Cody, and Peter Vorderer*

Over the past few years, *serious* games have become a hot topic at international conferences, conventions, and symposia. Interest in using games to educate, motivate, and change behavior has grown tremendously in a brief period of time, and by a truly international group of practitioners, civic leaders, health and human rights advocates, educators, gamers, and researchers. Ben Sawyer facilitated this movement when he launched the "Serious Games Initiative," which was followed quickly by the creation of important spin-off interest groups and Web sites like "Games for Health" and "Games for Change." A number of listservs and other discussion lists were initiated and have been successful in attracting an increasing number of game designers, educators, and academics alike. Indeed, as discussed in the chapters in this volume, an increasing number of disciplines are drawn to the topic of serious games, including health advocates, social advocates, immigration experts, political scientists, and others.

This vivid history is reflected in the term *serious games* that we have adopted for this volume. However, the term itself may easily be criticized for its literal meaning, which is an oxymoron: Games are inherently fun and not serious (Newman, 2004). Despite this apparent contradiction, many scholars and practitioners see serious games as involving fun, as well as being educational, engaging, impactful, meaningful, and purposeful.

When the video games industry began decades ago, few would have predicted its phenomenal success in profits and size. Who would have predicted that gaming would become bigger than the film industry? No one would have anticipated that digital games would one day be seen as a new educational tool that could fundamentally change learning, teaching, and training for upcoming generations. With new technologies at hand that allow for high resolution and 3D video and audio, social collaboration or competition, detachment from stationary equipment, and sensory-based input control, both genders and all age groups are now increasingly attracted to play (cf., Vorderer & Bryant, 2006). The evolution of digital games is clearly driven by entertainment purposes and interests, and their success is heavily associated with their entertainment value (Vorderer & Ritterfeld, in press).

Ideally speaking, serious games are building on this entertainment value, but they also add value through an educational component (Allen, 2004; Amroy, Naicker, Vincent, & Adams, 1999). In this respect, they represent a genre that was purposefully designed to be more than "just" fun (Dumbleton & Kirriemuir, 2006). At the same time, the educational value associated with serious gaming went beyond the academic purposes pursued by so called *edutainment applications*. *Edutainment*, at least in the beginning, was a rather unsuccessful attempt to involve play elements in more traditional curricular activities (Ritterfeld & Weber, 2006). Their focus was primarily on skill practice, and the entertainment value diminished substantially during exposure. The more recent serious games initiatives, however, refocused on deeper learning in the context of an enjoyable experience and on broader educational issues outside the school setting (Jenkins, 2006; Kline, 2004; Linderoth, Lindström, & Alexandersson, 2004).

In serious games we assume that the gaming element is prevalent; that is, the game is used as a toy (Goldstein, Buckingham, & Brougère, 2004). Using digital games as toys implies that the activity itself is intrinsically motivating because it provides fun (Vorderer, Steen, & Chan, 2006). Intrinsically motivating play implies deliberate selection of the toy, deliberate persistence of playing, and a high likelihood of repetitive usage (Oerter, 1999). Such forms of activity resemble what is known as enjoyment and entertainment (Vorderer, Klimmt, & Ritterfeld, 2004). The source of enjoyment, however, can be manifold and depends heavily on the user and the situation. While some consider challenges or competition as most enjoyable, others find enjoyment in role playing, creative work, or repetitive and low challenging activities.

Children's play is inseparably associated with learning. Children explore and acculturate the world through play, extend their skills and competencies, and experiment with possible selves. Only at a later point during elementary school do entertainment and learning start to drift apart. Older children may even associate play with being noneducational and learning with being anything but enjoyable. Media have long been considered to be a tool that would be able to reunite those two purposes: Educational radio or television shows, audio narratives, music, comic books, and more recently, digital, interactive media. There is considerable evidence from traditional media that such educational formats may work; that is, affect users by teaching them skills and content (see summaries in Singhal & Rogers, 1999; Singhal, Cody, Rogers, & Sabido, 2004), especially if the narrative transports the audience member into an emotionally involving and mentally stimulating, vivid world (Green, 2006; Green & Brock, 2002). But entertainment–education projects are often not as powerful as intended, and can be ineffective if sound social psychological theories are not appropriately applied. The successful educational outcome of embedding information in entertainment programming depends on a host of factors: capturing the attention of the users, making sure that the desired belief change or action to be adopted is discussed (repeatedly) or is visually shown

(i.e., modeled), and reinforcing belief or behavioral changes by showing that there are rewards or advantages in adopting the changes. It is also important that the viewers are emotionally involved and affected by the entertainment story, identify with or have empathy for characters in the program, and are motivated to seek more information after viewing the entertainment program or discuss the program with friends. If some of these elements are missing, educational outcomes can be limited or nonexistent (see, for instance, a comparison of different storylines in Morgan, Movius, and Cody, in press).

Ritterfeld and Weber (2006) have differentiated three different models of entertainment education. They describe previous attempts as manifestations of a motivational and a reinforcement paradigm, respectively. The motivational paradigm suggests that entertainment features in a product elicit the specific selection of it by providing interesting, enjoyable add-ons. In a similar way, the reinforcement paradigm supports persistent usage by offering gratifications after successful completion of a task. Both models are most common in educational media formats. Although they may have some value, the full potential embedded in entertainment education has not been fully explored. In fact, entertainment and education still appear as two distinct, separate aspects of game play that follow each other and demand that the user shift his or her focus from one to the other. As such, the educational aspect of media use may be introduced or responded to by moments of enjoyment, but they themselves remain as bare from such experience as any other educational format that was not specifically designed for playful exploration. In order to blend educational purposes successfully with the entertainment experience, paralleled experiences are needed. The educational component needs to be enjoyable in its own right, and the entertainment component should be closely associated with education.

Since their emergence, serious games have been holding the promise to fulfill this requirement for three reasons: First, game play is intrinsically motivating. Second, the responsiveness of the game environment gives immediate feedback to the user. And third, the content has or can have the complexity that allows for ample learning opportunities. Possible educational impact is not limited to knowledge acquisition or skill practice; it also includes exploration, problem solving, or incidental learning.

However, ever since the implementation of serious games as a new promising genre, its promoters and critics have been struggling to find a consensus on the definition of the term itself. Unsatisfied with the generic but conflicting message of the label *serious games*, some turned to more specific alternatives, such as describing games for specific purposes (e.g., games for health, game-based learning, persuasive games) or proposed alternatives (e.g., meaningful games). But the inherent problem of defining a genre by characteristics of the media remains: What would be the features that turn a game into a serious game? Is it the purpose of the game, the intention of the content developer, or the goal of the user? Is an educational purpose a sufficient criterion to call

a game serious? What if the effects of the game are not educational, and what if unintended effects are elicited? What about games that are designed from a pure entertainment perspective, but require substantial problem solving to be played? Are these games not serious because the publisher did not market them as such? Serious games can be customized digital games that were specifically and purposefully developed to educate (i.e., *Math* or *Reading Blaster*, *Tactical Iraqi*), or they can be over-the-counter games that primarily entertain its users while *also* providing educational opportunities (knowledge, skills) (i.e., *World of Warcraft*, *The Sims*).

Although advocates in the gaming industry often argue that game technology provides unique opportunities for deep, sustained learning (Michael & Chen, 2006), little systematic research is available to support this title. The central purpose of this book therefore is to examine critically the claim that playing games can provide learning that is deep, sustained, and transferable to the "real world." This volume is devoted to continuing this discussion in recognition of available scientific evidence. As this book is primarily social science driven, the reader will hereby be introduced to approaches that focus on the gaming process and the users' experiences more than on technological game elements.

To enter the discussion, however, we ask the reader to accept a fuzzy definition of serious games. As a starting point we define serious games as any form of interactive computer-based game software for one or multiple players to be used on any platform and that has been developed with the intention to be more than entertainment.

The second purpose of this volume is to provide a systematic overview of serious games research; that is, on theories that have been applied, on empirical evidence, and on methodological challenges. Although the development in this academic field is no doubt very impressive and there are a number of studies on the effectiveness of specific applications, we are still missing a comprehensive and systematic overview of the mechanisms that drive or don't drive the expected effectiveness. With this volume, we try to fill the gap in providing an academic overview on the mechanisms and effects of serious games from a primarily social science perspective. That means that we investigate the psychological mechanisms that take place during gaming, but also in game selection, persistent play, and gaming impact. Although we are far from introducing one theory that fits all applications, we have assembled solid scientific knowledge that guides our understanding of serious game play from various theoretical perspectives. We are specifically looking at the educational impact on the individual and on societies at large, while exploring the complex interplay of entertainment and learning in serious gaming. We use the term *educational* for any desired increase in skills, knowledge, competency, and mastery, and favored changes in attitudes, values, or behaviors.

Throughout the book we also use the generic term *digital games* to include all interactive video and computer games played on any platform by one or

multiple players. We further decided to differentiate between a player and a gamer throughout the book: The term *player* refers to an individual (e.g., a research subject) who is playing a game, whereas the term *gamer* is used within the context of gaming as a cultural phenomenon.

This book is the result of a collaborative effort on the part of a research group that was formerly situated at the University of Southern California (USC), Annenberg School for Communication where Ute Ritterfeld and Peter Vorderer used to teach and do their research before they joined the VU University Amsterdam and where Michael Cody is still affiliated. In May 2007 a workshop, initiated by the USC games research group, on serious games for learning, development, and change involved many of the contributors of this book and served as a starting point for discussions that are reflected throughout this volume. Through much of 2007 and 2008 Shawna Kelly and Lauren Movius, two doctoral candidates at USC, worked as copyeditors and editorial assistants to help complete this volume. Their timely efforts helped make this volume a better one, and many chapters benefited from their skillful work in grammar, language use, and creative ideas. The editors are indebted to both for being so helpful over months of work on this book. Many thanks also to Dimitrina Chakinska who helped with proofreading.

The volume is divided into four parts. The chapters within each part are related and suggest linear reading. Besides this introductory chapter, part I (Serious Games: Explication of an Oxymoron) contains three additional chapters that build on each other in search of the nature of serious games (Ratan & Ritterfeld; Wang, Shen, & Ritterfeld; Shen, Wang, & Ritterfeld). Part II is devoted to Theories and Mechanisms, part III to Methodological Challenges, and part IV to Applications, Limitations, and Future Directions. For part II and III, we adopted the structure of pairing fundamental chapters written by renowned scholars from communication science and psychology who have been researching digital games (Gee; Graesser, Chipman, Leeming, & Biedenbach; Lieberman; Sherry & Dibble; Konijn & Nije Bijvank; Kafai; Klimmt; Shute, Ventura, Bauer, and Zapata-Rivera; Ennemoser; Shapiro and Peña) with a supplementing perspective in a corresponding social science discipline (Bryant & Fondren; Blumberg & Ismailer; Subrahmanyam & Greenfield; Ritterfeld; Jansz & Vosmeer; Wang & Singhal; Bente & Breuer; Watt; Ravaja & Kivikangas). Through this strategy we expect to connect the still young area of digital games research with the foundations of social science and to facilitate the exchange between two of its core disciplines, namely psychology and communication science.

We also distinguish between three desirable outcomes of digital game play: learning, development, and change. Learning is defined as the intentional acquisition of skills or knowledge through deliberate practice and training and has therefore a pedagogical focus. With development we emphasize the rather incidental psychological impact of game play on processes of human development such as identity or attitude formation or emotional regulation

that may be facilitated or initiated through game play. Finally, change addresses social intervention; for example, political or health behavior. Although not completely distinct, focusing on these three dimensions should ensure that we cover a broad range of serious games' possible impacts.

The coming together of fundamental and applied communication as well as psychological concepts in the development of serious games is exemplified in the fourth and final part of this book (Jung, Yeh, McLaughlin, Rizzo, & Winstein; Miller, Christensen, Godoy, Appleby, Corsbie-Massay, & Read). This perspective will be supplemented by three concluding chapters that are written from a nonsocial science perspective: First, experts in academic game design (Jenkins, Camper, Chisholm, Grigsby, Klopfer, Osterweil, Perry, Tan, Weise, & Guan) and representatives of the gaming industry (Stacey Spiegel & Rodney Hoinkes) provide insights into most recent serious game developments. Although this book has an explicit focus on social science, we acknowledge the necessity for a broader interdisciplinary study of the phenomena. Our final chapter (Raessens) offers a humanistic perspective and was chosen as an outlook into a different paradigm in which meanings and contexts of games and gaming are investigated. We hereby try to contribute to overcome the methodological divide in games research as described by Williams (2005) and like to look ahead to a more integrated and interdisciplinary study of digital games.

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Chapter 2

# Classifying Serious Games

*Rabindra Ratan and Ute Ritterfeld*

The fundamental goal of this research is to elucidate the important characteristics of current serious games, thus providing a tool through which future research can examine the impact of such games and ultimately contribute to their development. Understanding the true impact of serious game play requires first an understanding of what serious games are. The present research lays the foundation for such an understanding by developing a classification system of all serious games based on a dataset of over 600 serious games. This classification system could potentially contribute to rigorous empirical investigations of serious games, such as those that are reviewed in part II of this book, by presenting a framework within which such games could be analyzed systematically. By considering the dimensions and categories of serious games offered here, such research would be better positioned to suggest promising directions for the development of this valuable genre of digital games.

Serious games are an increasingly important medium with respect to education, training, and social change (Michael & Chen, 2006). Such games are intended to facilitate deep and sustained learning (Gee, 2003, 2007) and to reach wide audiences by building on the native language of the Games Generation (Prensky, 2006). The past few years have shown an increase in the prevalence of such games, marked by the emergence of various organizations, Web sites, and conferences dedicated to advancing this medium. Educators, health advocates, and CEOs of nonprofit organizations are joining industry officials and game designers in advertising the assumed superiority of serious gaming as an innovative means to educate the public. Indeed, interactive games may prove more effective than other educational technologies and traditional pedagogy (cf. Prensky, 2006; Ritterfeld & Weber, 2006).

Educators are searching for innovative learning strategies that blend enjoyment with education. Games technology would, so the assumption goes, provide the entertainment frame in which serious content could be embedded, resulting in the emergence of serious games as a distinct genre in the world of interactive media. Although some researchers claim that any digital game may provide (incidental) learning opportunities regardless of whether it is considered a serious game or a nonserious entertainment game (cf. Ritterfeld &

Weber, 2006), serious games is a genre that explicitly focuses on education. Thus, the genre has become associated with positively connoted features such as seriousness, education, or learning. Consequently, this recently developed genre may have the power to influence attitudes and selective exposure of digital gaming toward serious gaming by users, educators, and parents.

With the serious games genre, developers took a distinct stand against only-for-entertainment games, claiming that the content of serious games is highly desirable from an educator's perspective. The serious games genre implies that the outcome of playing these games is always advantageous for the player: first by facilitating learning experiences, and second by not having any negative or harmful impacts. Games that would elicit aggression or addiction would not qualify as serious games. On the contrary, serious games should always work as intended, contributing to a self-guided, enjoyable, and therefore deeply sustained learning experience.

Yet, not only is there a dearth of formal research about the true effectiveness of such games (Ritterfeld, Cody, & Vorderer, this volume, chapter 1), but even the definition of a serious game is vague and needs clarification. There is a common stereotype that serious games are synonymous with *edutainment* games, defined by the Entertainment Software Rating Board (ESRB) as those that "provide users with specific skills development or reinforcement learning within an entertainment setting" where "skill development is an integral part of product" (Entertainment Software Rating Board, 2007). While all edutainment games are certainly serious games, the body of serious games extends beyond edutainment, enveloping almost every digital game that has a purpose in addition to entertainment. Consistent with this notion, the Social Impact Games Web site defines serious games as "entertaining games with non-entertainment goals" (Social Impact Games, 2008). But a problem arises when attempting to identify such goals because the game producer's definition of its genre may not be consistent with the user's experience nor the psychological reality behind that experience. Hence, identifying an exact definition of serious games is neither a straightforward nor pragmatic endeavor. The simplest solution to this problem is to treat every game that has been called a serious game as a serious game.

In this chapter we temporarily accept the fact that some games are defined as serious by their publishers without reflecting on whether this claim does actually hold true in order to be able to describe and classify the current body of this new genre. Using only the qualification that a digital game has been deemed serious to some extent, we propose a classification system of serious games that categorizes each game along natural boundaries within the larger body of serious games. This classification system takes four dimensions into account: primary educational content, primary learning principle, target age group, and platform. The result is a basic map of the world of serious games intended to serve game scholars and developers to further their endeavors.

## Developing a Classification System of Serious Games

In order to develop a classification system of serious games, it was necessary to assemble and analyze an extensive database of such games. Playing every single game was not possible, given the large number of serious games and limited amount of resources, so information about each game was collected from secondary resources. This information served as the basis for analysis through which natural groupings of certain characteristics were identified. The following sections describe the process of assembling this database and conducting this analysis.

### *Serious Games Database*

The present classification system is based on a database of games that were self-proclaimed, by the game developers, or deemed by any other organization or Web site, as serious. The games in this database included English-language games, mostly developed in the United States with a minority from Asia or Europe, that were released between 1997 and 2007, though the number of games was skewed toward the latter half of the decade. They were collected via e-mail lists for serious game developers, Web sites dedicated to serious games, and simple Internet searches. The unit of analysis was a single game.

In the first wave of data collection, serious game developers were contacted through various professional organizations, specifically, the Serious Games Initiative (http://www.seriousgames.org), which includes the Games for Health (http://www.gamesforhealth.org) and Games for Change (http:// www.gamesforchange.org) communities, as well as the Games Studies section of the International Communication Association (http://www.icahdq.org). E-mails were sent to these lists requesting that game developers enter information about their serious game into an online survey template. This survey included questions about the games' serious and narrative content, educational and entertainment methods, major purpose, and target demographics. The questions included both multiple choice and open-ended responses and were based on a preliminary analysis of a small sample of serious games identified through Internet searches.

A significant amount of descriptive information about serious games was gleaned from two Web sites dedicated to classifying digital games. The first was the official Web site for the ESRB (http://www.esrb.org). This Web site provides ratings and classifications of all types of digital games, including edutainment games. As discussed above, contrary to the common stereotype, not all serious games are edutainment games, but all edutainment games are serious games. Therefore, all of the 281 edutainment games from the ESRB list were included in the database.

The other aggregative Web site, dedicated entirely to games with a purpose beyond entertainment—their definition of serious games—was the Social

Impact Games Web site (http://www.socialimpactgames.com), sponsored by the Games to Train organization (http://www.games2train.com). Social Impact Games provides an extensive list of serious games, categorized according to the content types of the games. These content types are similar to the Primary Educational Content dimension of the present classification system. One hundred and seventy-five games were included in the database from this list.

The remainder of the information on serious games included in the database was collected through simple Internet searches. The Wikipedia entry on serious games (http://en.wikipedia.org/wiki/Serious_game) provided links that led to information on 50 additional serious games, and 83 further games were identified using Internet search engines. In some cases, the information collected on these games was similar to the information requested in the survey sent to the game developers, but the majority of these sources contained only basic descriptive information about the games.

In conclusion, 23 games were identified in the surveys filled out by game developers, 281 games and 175 games identified from the ESRB and the Social Impact Games Web sites, respectively, and 133 games identified through Internet searches. Hence, a total of 612 games are represented in the database and used to develop this classification system.

### *Iterative Analysis and Category Development*

After the database was assembled, the classification system of serious games was developed by iteratively examining the information collected about the games from each of the sources. Two researchers consensually searched for natural groupings among the games based on characteristics of the game that related to the larger dimension in question. For example, researchers identified the different age groups that each game targeted and these groups eventually became the categories within the Target Age Group dimension. In order to refine these categories, the researchers classified all of the games according to the groupings and then redefined the groupings according to inconsistencies identified. This process was repeated numerous times until the groupings were as all-inclusive and as mutually exclusive as possible.

## Dimensions of Serious Games

The classification system of serious games includes these four dimensions within which the games were categorized: primary educational content, primary learning principle, target age group, and platform. The following sections define each dimension, present the proportions of games found within the categories of each dimension, and provide some examples of games within the categories.

### *Primary Educational Content*

To define the primary educational content dimension of the games, we categorized the driving force that makes the game serious and not simply entertaining into the following areas: academic education, social change, occupation, health, military, and marketing. Since many of the games contained more than one type of educational content, we identified which content the developer intended to be most important, gleaning clues about this intent from descriptions of the games and their potential effects. Figure 2.1 shows the proportions of games based on their primary educational content.

Games with primarily academic educational content are by far the most prevalent (63%) within the dataset. These games, not surprisingly, are intentionally designed to teach material traditionally taught within an academic environment. This material is often curriculum-based content, including algebra and biology, or extracurricular content, such as nanotechnology or religion. Examples of games in this category include the American Association for the Advancement of Science's *Kinetic City* (2005), "A program of standards-based online science games and other activities for kids in grades 3–5," Ramsbottom, Sidran, and Sharp's *Londoner* (2007), a game in which students experience life in 17th century London, and Nobel Web AB's *Electrocardiogram* (2008), in which players practice "as an ECG [electrocardiogram] technician in a health clinic…and perform ECGs on patients."

Games in which the primary educational content is related to social change make up 14% of games in the dataset. These games espouse particular social

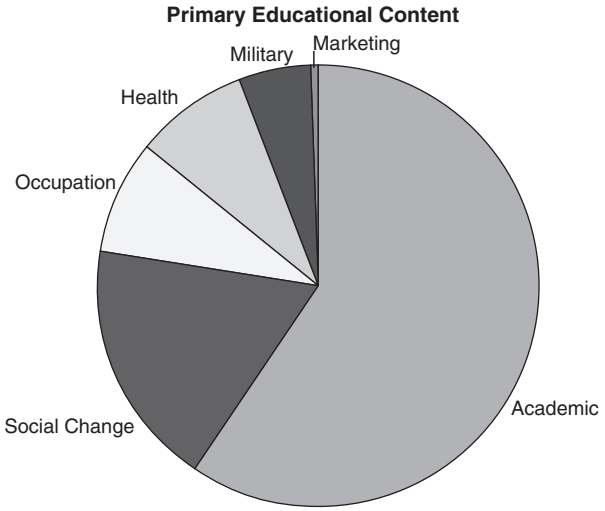


*Figure 2.1* Proportions of games within each primary educational content category.

agendas, such as political issues, like supporting particular political candidates, and social issues, such as fighting world poverty or protecting the environment. Examples of games in this category include *Darfur is Dying* (2006), in which players assume the perspective of a displaced Darfurian, negotiating the forces that threaten survival in a refugee camp and learning about the crisis in Sudan, *Waterbusters* (2006), in which players learn how to conserve water around the home, and *Hate Comes Home* (2008), in which players go back in time to prevent a school dance from ending in a hate crime.

Games classified as having primarily occupational content are less prevalent, accounting for 9% of the games. These games give players knowledge and skills that can be applied specifically to the players' occupation, such as training to perform specific actions or imparting knowledge and skills that are broadly applicable to the players' occupations. Examples of games in this category include *Objection* (2008), a series of games to train lawyers in courtroom skills, *The Business Game* (2008), in which players develop and market a new business product, and *Stone City—Cold Stone Creamery, Inc* (2008)., a game designed to train Cold Stone ice cream employees to serve ice cream with specific proportioning to accomplish desired profitability.

Games with primarily health-related content make up 8% of the games. These games provide players with knowledge and habits that improve health, reduce risks, or enable coping with health problems in the player or others. The majority of the games in this category focus either on physical health, such as cancer or sexually transmitted diseases (STDs), mental health, such as dealing with depression, or on a combination of the two. An example of a game in this category is *Re-Mission* (2006), a game for cancer patients in which players manage realistic, life-threatening side effects associated with cancer with the intent of better understanding and managing their physical disease. Other examples include *Grow Your Chi* (2004), in which players grow their chi, thereby avoiding depression, by clicking on the appropriate clouds, and *Shagland* (2008), in which players collect condoms and avoid drinking alcohol in order to have safe sex.

Games in which the primary educational content is related to the military made up 5% of games in the dataset. These games provide players with knowledge and skills that can be applied to military activities, such as air strikes and infantry missions. The lack of prevalence of military-related games is an indication of the sampling bias within this research. Many more military-related simulations and pieces of software that can be considered serious games are likely to exist than those presented in this sample, but such games are most likely used exclusively within the military and so it would have been impossible to collect them within this sample or estimate their prevalence. Examples of games in this category include *America's Army* (2002), a first-person shooter game and recruitment device for the U.S. Army in which players go through basic training and develop their Army career, and *Anti-Terrorism*

*Force Protection* (2008), which trains officers to make decisions related to their command's antiterrorism posture.

Games with marketing related primary educational content were the least prevalent (<1%). These games reinforce brand awareness, promote products, or target players as potential customers. The lack of prevalence of such games is another indication of a sampling bias within this research. There are likely many more games that have a marketing intent, but such games have traditionally not been classified as serious and so these games were not identifiable through the methods used to collect the sample. Whether marketing can be considered educational is open to debate. This category is listed here as an indication of the potential for such games to be considered serious games, although additional research should be conducted in order to develop a more nuanced understanding of such games. Examples of games that were found in this category include *The Arcade Wire: Xtreme Xmas Shopping* (2008), in which players have a shopping list and must use whatever means necessary to purchase every item, and *Xtreme Errands* (2008), in which players must utilize the features of the new 2006 Jeep Commander in order to prepare for four big weekend events.

### *Primary Learning Principles*

This dimension of the classification system is based on an understanding that the unique advantage of digital games is not so much in their delivery of curricular content but in providing opportunities for exploration, experimentation, and problem solving (Jenkins et al., this volume, chapter 26). Consistent with this notion, we identified the following four primary learning principles through which serious games attempt to impart skills, knowledge, or ideas to the players: practicing skills, knowledge gain through exploration, cognitive problem solving, or social problem solving. If a game utilized more than one learning principle, we determined the primary principle embedded in the game based on descriptions of the game play. Figure 2.2 shows the proportion of games in each primary learning principle category.

About half (48%) of the games within the dataset are classified as having the primary learning principle of practicing skills. These games induce players to practice and solidify basic or advanced skills. These games often focus repetitively on a narrow scope of information and activity. Games in this category include *Math Blaster* (2006), in which players use math skills to complete missions, *The Binary Game* (2008), in which players create binary numbers to learn how the binary numeral system works, and *River City* (2004), in which players use scientific inquiry and hypothesis testing to address 19th century health problems.

Games using the primary learning principle of cognitive problem solving were less prevalent than games that focus on practicing skills, representing about a quarter (24%) of the games in the dataset. In these games, the

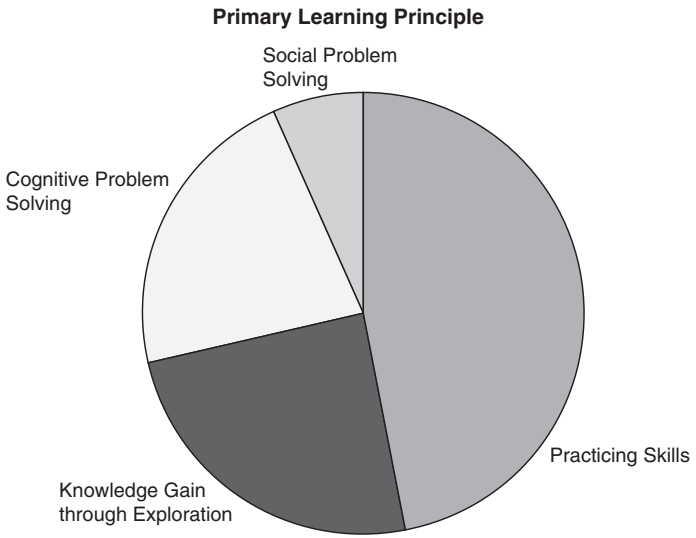


*Figure 2.2* Proportions of games within each primary learning principle category.

player engages deeply, both cognitively and creatively, with material such as puzzles, brainteasers, or complex hypothetical situations. Games in this category include *Brain Booster* (2008), in which players engage in exercises such as Sudoku, word scrambles, and memory grids, *Urban Science* (2006), in which players learn about urban planning by developing a comprehensive, ecological plan for their community, and *Building Homes of Our Own* (2002), in which players manage the issues of building and selling a home.

The primary learning principle of knowledge gain through exploration was similarly represented (21%) within the dataset. In these games, players acquire information, such as historical or biological facts, but do not engage deeply with such information. Contrary to practicing-skills games, these games focus on a broad scope of information with a small amount of repetition. Games in this category include *Paestum Gate* (2008), in which players explore an archaeological site in southern Italy, and *Revolution* (2005), in which players experience the daily social, economic, and political life of colonial Williamsburg on the eve of the American Revolution.

Games with the primary learning principle of social problem solving were by far the least prominent (7%). In these games, players solve small- or large-scale social problems by interacting in teams, collaborating, or taking responsibility as members of society. It should be noted that games that have a positive social message do not necessarily focus on social interactions and thus may not fall into this category. Games in this category include *Entertech* (1998), in which players engage with coworkers and supervisors, learning about workplace ethics, teams, and company policies, *Quest for Independence* (2008), in which players engage in activities integral to living on their own, such as getting a job,

using social services, getting food, and staying healthy, and *Hate Comes Home* (2008), in which players go back in time to prevent certain incidents from ending in a hate crime.

### *Target Age Group*

All games in the dataset were classified into the following four age groups: (1) preschool and below; (2) elementary school; (3) middle school and high school; and (4) college, adult, and senior. Regarding this final group, it should be noted that although there are some games that seem more appropriate for college-age or senior players specifically, most serious games beyond the high school level do not target specific age ranges. Hence, it would not have been appropriate to split this group into smaller mutually exclusive groups. Figure 2.3 shows proportions of games within each target age group.

The most prevalent age groups were the elementary school and the middle and high school groups, with 39% of all the games targeting each age group, respectively. Less prevalent (16%) were games that targeted the college, adult, and senior age group, followed by the games in the preschool and below group (5%). Considering that the average entertainment digital game player is 33 years old (Entertainment Software Association, 2006), this indicates that serious games target younger players than other games, which makes sense given the prevalence of serious games with primarily academic educational content. An example game in the preschool and below category is *Baby Felix Creativity Center* (2007). An example game in the elementary school category is *Jump Start Advanced First Grade* (2008). An example game in the middle school and

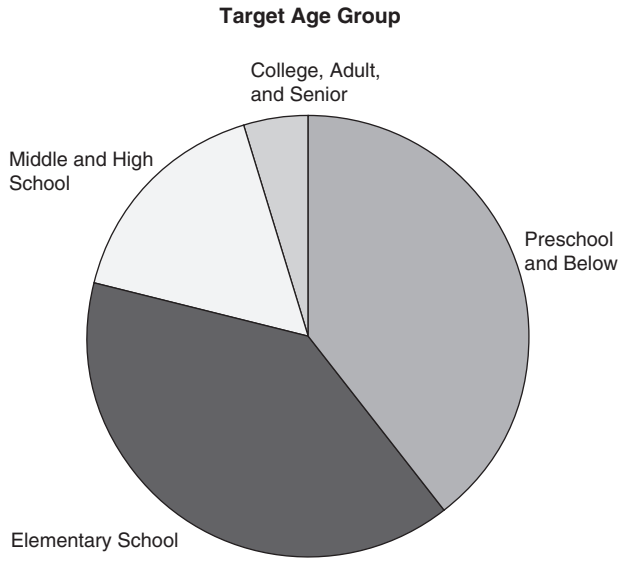


*Figure 2.3* Proportions of games within each target age group.

high school category is *Revolution* (2005). And an example game in the college, adult, and senior category is *The Enterprise Game* (2008).

### *Game Platform*

While the effectiveness of a serious game is certainly dependent on the game's content, the game's platform may also play a role, so games in the dataset were classified according to whether they were made for play on computers or other platforms. The vast majority of the serious games in the dataset (90%) were developed for a computer platform. The remaining non-computer-based games (10%) included games made for DVD, Nintendo Game Boy, Nintendo 64, Nintendo DS, Palm Pilot, Playstation, and Plug-and-Play. Although playing experience and accessibility differ vastly between these non-computer-based platforms, the representation of each platform in the dataset was too small to categorize them separately.

According to Foehr (2006), computer-based digital games are among the most multitasked media among U.S. youth, while non-computer-based digital games are the least multitasked media. This loosely implies that players may pay more attention to non-computer-based digital games, the least represented faction within our dataset. Although current research does not explain this phenomenon, it may be easier to multitask with other computer programs while playing computer-based games simply because of the ease of accessibility on an Internet-linked computer or because the player does not need to turn to another screen. Another explanation may be that on average, non-computer-based games use more computing and video-processing resources than computer-based games, implying that these games have more engaging game play or graphics. Regardless, this discrepancy is important because it implies that the serious component of the game is likely to be more effective when players are not multitasking.

Aside from multitasking, platform differences may significantly impact the effectiveness of serious games based on various facets of the platforms. For instance, a computer's control interface, the keyboard and mouse, is quite different from typical noncomputer control interfaces, such as game pads and remotes. Perhaps different types of input devices facilitate learning in different ways. Or perhaps screen size or potential mobility of a platform affects the ways that serious games are played. Although the present categorization does not provide a comparison of non-computer-based platforms, it should still be apparent that these are worthy questions for serious games researchers to pursue.

## Interactions between Educational Content and Learning Principles

By examining the interactions of the various categories of educational content and learning principles, we found that games with both the primary purpose

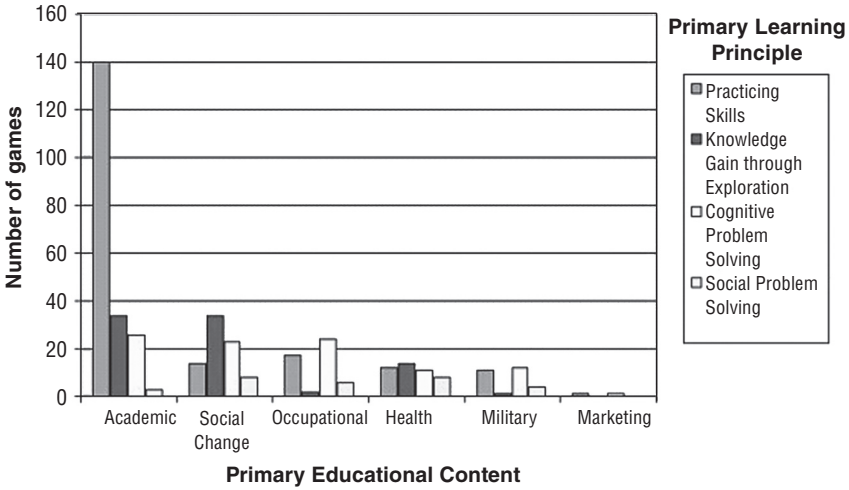


*Figure 2.4* Distribution of games within the primary educational content and primary learning principle categories.

of academic education and the educational goal of skills practice were by far the most prevalent. However, in all other content areas, skills practice does not play this superior role and knowledge gain through exploration and cognitive problem solving are applied at least as extensively. Figure 2.4 shows the distribution of games within each combination of categories.

That the majority of serious games attempt to teach the same subject matter taught in schools, using the same methods of repetition and practice, is not surprising. In this sense, the majority of serious games classify as edutainment according to the ESRB's definition of the term. Unfortunately, most serious games do not go beyond this traditional role and are certainly not fulfilling the potential that serious games promise. Moreover, whether a game is the most suitable format for practicing skills is questionable. It can be argued that skill practice remains boring and uninteresting even if it is attached to interactive graphics and embedded in a narrative context. In this situation, the enjoyability features that games add only serve for initial motivation ("this is a different way of practicing") and more sophisticated, visualized gratification. In both cases, enjoyability and educational experiences remain detached, and the promise of an entertainment-education link is not fulfilled. As a consequence, such serious games would not be played deliberately over a longer period of time and would require similar external prompts or gratification schedules as any other skill practice. As Ritterfeld and Weber (2006) argued earlier, a successful blending of entertainment and education in game play requires parallel experiences and is best realized in game simulation that invites exploration and requires complex reasoning. We believe that applying these learning

principles to many areas of academic education would significantly enrich the quality and effectiveness of serious games.

## Final Remarks

The current research does not provide the basis for in-depth speculation about the future of serious games, but it does create a broad snapshot of the present state of serious games and a structure that could be utilized by future research in this area. Overall, the described trends indicate that serious games span a wide range of purposes and educational goals, with the academic education and practicing skills categories representing the vast majority of games, validating the stereotype that serious games consist mostly of edutainment games. Yet, considering that the sample contained over 600 games, the other categories are still important members of the serious games family. It seems obvious that the number of serious games has been increasing and will continue to do so, and this is supported by the finding that there are more games in the present database produced during the latter half of this past decade. A variety of industries and organizations are increasingly adopting serious games as a means of accomplishing their goals, so other learning principles and educational content areas, besides practicing skills within the realm of academic education, should ostensibly grow in representation. Future research might examine which categories of serious games are growing fastest and perhaps identify other trends in the development of the various serious games categories.

The classification system described in this chapter should serve as a guide to understanding and interpreting serious games as a medium. Future research on serious games could use this framework to situate the games of interest within the larger landscape of serious games. For example, by noting that a specific health-oriented game focuses on social problem solving and targets players who are over high school age, a researcher could argue that this game is relatively unique within the body of serious games and perhaps this has some bearing on its effectiveness. Thus, the classification system presented here provides a new tool for the analysis of serious games.

However, one limitation of this tool should be mentioned. As discussed earlier, creating the classification system was an iterative process of classifying the games according to the groupings and defining the groupings according to the games, in an attempt to develop groupings that were both as all inclusive and mutually exclusive as possible. While all inclusiveness was generally easy to achieve, mutual exclusivity was difficult to attain while maintaining a relatively small number of groupings. Exacerbating this dilemma, in some cases it was difficult to ascertain whether a game's primary purpose or educational goal was in fact primary or only secondary. For example, in *Anatomy of Care* (2008), the player acts as one of five hospital-team members, learning about the impact of their actions on patient care. This game is clearly related to health, but is it

occupation related as well? The game developer's description does not specify whether the game is intended to be used by healthcare professionals or the general public, most likely implying that it is suitable for either type of player. Hence, health- and occupation-related categories are not mutually exclusive. Despite this caveat, the classification system developed in this chapter is flexible enough to absorb future development trends in serious games and is a strong foundation for future research in the field.

The potential applications of the present classification system are too diverse to anticipate completely at this time, but it seems likely that nearly all types of research on serious games could benefit from this framework. An important current question in the field is whether serious games fulfill their educational potential. Two chapters in this volume address this question in two subsequent steps: first, by examining the factors that make a game enjoyable (Wang, Shen, & Ritterfeld, this volume, chapter 3), and second, by asking whether these fun factors are sustained in games specifically developed for their serious content (Shen, Wang, & Ritterfeld, this volume, chapter 4). These chapters represent the first research to utilize the present classification system to explore a research question about serious games. Ideally, the findings from this and future research that employs this classification system will eventually be incorporated into serious game development, facilitating the creation of improved serious games that can accomplish their goals beyond entertainment as effectively as possible.

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Chapter 3

# Enjoyment of Digital Games

## What Makes Them "Seriously" Fun?

*Hua Wang, Cuihua Shen, and Ute Ritterfeld*

Given the nature of their labeling, *games* are expected to be *fun*! Popular and commercially successful digital games are all fun entertainment games. But the fun appeal can be instantly diminished when a game is labeled a *serious* game—stereotyped by games designed for purposeful educational endeavors and prosocial causes. While Ratan and Ritterfeld (this volume, chapter 2) provided an overview of currently existing serious games, we focused on extracting fun factors in the context of *entertainment* games. What is fun may be contingent upon individual players and their play contexts; and what makes entertainment games enjoyable may not have the same magical effects in serious games. Yet, by identifying game elements that contribute to overall enjoyability, we can establish a useful frame of reference for understanding media enjoyment in both entertainment and serious games, and for exploring new strategies to improve the fun quality of serious games.

We begin this chapter by synthesizing the literature on enjoyment of media entertainment in general, and enjoyment of digital games in particular, providing a rationale for our unique expert-user approach and research methodology. We then describe in detail the procedure we adopted to develop a comprehensive list of game fun factors, using a combination of inductive and deductive reasoning. Finally, we discuss general trends, propose a potential "Big Five," and present the conceptualization of a three-level threshold model of digital game enjoyment.

### Enjoyment: At the Heart of Digital Gaming

Communication scholars and media psychologists generally refer to *enjoyment* as the positive responses of individuals toward media technologies and content (e.g., Bryant, Roskos-Ewoldsen, & Cantor, 2003; Vorderer, Klimmt, & Ritterfeld, 2004). The same phenomenon has been studied under different terminology, such as *pleasure*, by researchers across the disciplines of communication, psychology, education, and neuroscience (e.g., Berridge, 2003; Bosshart & Macconi, 1998; Gee, 2005). Entertainment, via mass and interactive media, is a major source of enjoyment in contemporary societies (Bryant & Vorderer,

2006; Bryant & Zillmann, 2002; Zillmann & Vorderer, 2000). Enjoyment can come from unpleasant media entertainment experiences such as suspense, but most often from pleasant ones: (1) sensory pleasures, (2) ego-emotions, (3) cognitive competence, and (4) socioemotions (Bosshart & Macconi, 1998; Vorderer, 2001; c.f., Vorderer, Wulff, & Friedrichsen, 1996; Zillmann & Bryant, 1994). Vorderer, Klimmt, and Ritterfeld emphasized that enjoyment, which is at the heart of media entertainment, has multiple dimensions (i.e., physiological, affective, and cognitive). They further explicated a conceptual model that addresses the complex and dynamic nature of entertainment experiences, including specific prerequisites of enjoyment that must be fulfilled both by the media and the individual users (Vorderer, Klimmt, & Ritterfeld, 2004). Grounded in the above reviewed understandings of entertainment in general and enjoyment in media entertainment in particular, we focus on enjoyment in the context of digital games in this chapter.

### *Enjoyment Gaps between Game Developers and Players*

Game developers intend to make games fun, and to this end for years they have been using heuristics as guiding tools for usability tests. These heuristics usually include game interface, game mechanics, game story, and game play (e.g., Clanton, 1998; Desurvire, Caplan, & Toth, 2004; Federoff, 2002; Fullerton, Swain, & Hoffman, 2004). However, what the game developers identify as key design factors for game enjoyment may not necessarily match with what the game players want. In fact, there can be substantial differences in fun factor preferences between the two groups (e.g., Choi, Kim, & Kim, 1999). Ultimately, what matters the most is how individual players feel about whether a game is fun or not. Therefore, it is not surprising to see that most of the scholarly discussions about game enjoyment come from the uses and gratifications perspective (e.g., Sherry, Lucas, Greenberg, & Lachlan, 2006). To summarize prior theoretical and empirical work, we organize the following review into three interrelated topical areas: *technological affordances*, *intrinsic motivations*, and *alternative reality*.

### *Different Approaches to Understanding Game Enjoyment*

Vorderer (2001) suggested that Oerter's (1999) play theory offers a useful framework for understanding entertainment media experiences and proposed to (re) frame digital gaming as a form of play in coping with reality: "an intrinsically motivated action, accompanied by a change in perceived reality that is repeatedly used and highly attractive" (Vorderer, 2001, p. 256). Klimmt (2003) further proposed an integrated conceptual model of game enjoyment and argued that during game play the enjoyability of a game may be determined by different factors at three levels: At the first and basic level, the play process can be viewed as a series of quick and direct feedback loops between the player and the gaming system which result from unique technological affordances of digital games

(e.g., interactivity) that enable players to have an experience of effectance. At the intermediate level, the play process is viewed as a sequence of interconnected episodes triggered by the player's intrinsic motivations (e.g., curiosity) that unfold with a sense of suspense-relief and increased self-esteem. At the last and most complex level, the play process is viewed as a whole, characterized by the player's active role in engaging with the narrative and their experience of perceived alternative reality in the gaming world (e.g., presence).

Gaming technologies include several features that are distinct from traditional media (for a comprehensive review on the technological affordances of digital games, see Klimmt, this volume, chapter 16; Wang & Singhal, this volume, chapter 17). One of the most obvious features is interactivity (Grodal, 2000; Vorderer, 2000). Based on their systematic review, Lee, Park, and Jin (2006) suggested adapting the concept of interactivity to capture the characteristics of digital games and define it as "a perceived degree that a person in a communication process with at least one more intelligent being can bring a reciprocal effect to other participants of the communication process by turn-taking, feedback, and choice behaviors" (p. 263). Compared with traditional leisure activities such as book reading and television watching, digital games engage more active and higher-level user participation by providing the player with opportunities (or sometimes require the player) to interact with elements in the gaming world and to experience the outcomes of their experimental decision making (Klimmt & Vorderer, 2007; Vorderer, 2000). Such experiences of effectance require only minimal input actions from the player but can result in immediate and multitude of responses from the gaming system, often providing the player a sense of control and empowerment (Klimmt, 2003; Klimmt & Hartmann, 2006). Recent experimental research has shown that game players enjoy watching the results of their own choices and actions in the gaming world (Klimmt, Hartmann, & Frey, 2007).

Intrinsic motivation is another approach of studying game enjoyment. Based on their pioneering work in the 1980s, Malone and Lepper developed a taxonomy of intrinsic motivations in the context of educational digital games for children with four theoretical categories: challenge, fantasy, curiosity, and control (Lepper & Malone, 1987; Malone, 1981a, 1981b; Malone & Lepper, 1987). Similarly, Cordova and Lepper (1996) summarized three basic underlying game factors as choice, fantasy, and challenge. Sherry et al. (2006) extracted six game uses and gratifications dimensions based on results from focus groups and surveys: competition, challenge, social interaction, diversion, fantasy, and arousal. With the increasing popularity of social computing, game researchers and practitioners have recently started to explore player motivations in the virtual worlds, such as massively multiplayer online gaming worlds. Bartle (1996, 2004) offered a typology of player types, placing four types of game players (i.e., killers, achievers, socializers, explorers) based on two intersecting behavioral dimensions (i.e., action vs. interaction, player vs. gaming world). Building on prior work, Yee (2005, 2007) adopted a factor analytic approach and classified three overarching motivations of play in online games: achieve-

ment, social, and immersion. Grounded in self-determination theory, Ryan, Rigby, and Przybylski (2006) looked into intrinsic motivations for digital game play, showing empirical evidence that players' perceived in-game autonomy, competence, and relatedness (i.e., sense of connection) are significant predictors of game enjoyment. Other theories such as mood management theory and affective disposition theory also hold potential for explaining game players' motives for selective media exposure and their association with game enjoyment (Bryant & Davies, 2006).

The last tenet of game enjoyment has to do with the digital gaming experience as a state of alternative reality. Scholars have approached this aspect from different, yet somewhat overlapping perspectives. For example, presence is a concept used to describe a psychological state in which virtual objects are experienced as actual objects, or perceptual illusion of non-mediation (e.g., Lee, 2004; Lombard & Ditton, 1997). Although how presence facilitates game play experience and contributes to game enjoyment is not yet clear, Tamborini and Skalski (2006) point out that the relationship between the two cannot be overlooked. Arguably, similar media phenomena have been studied under different terms with their own scholarly rationales and focuses: immersion (Hubbard, 1991), escapism (Oerter, 1999), absorption (Slater and Rouner, 2002), transportation (Green, Brock, & Kaufman, 2004), and realism (Shapiro, Peña-Herborn, & Hancock, 2006). However, the flow theory by Csikszentmihalyi (1997) is perhaps the most frequently adopted framework by game designers and researchers. Even a game-flow model was proposed with eight elements (i.e., concentration, challenge, skills, control, clear goals, feedback, immersion, and social interaction) as well as a set of criteria for evaluating player enjoyment in games (Sweetser & Wyeth, 2005). As well explained by Sherry (2004), although this theory was not developed with digital games in mind, enjoyment of media and game enjoyment in particular share many similar characteristics with the flow experience—"focused concentration, loss of self-consciousness, a sense that one is in control of the situation, distortion of temporal experience, and the experience of the activity as intrinsically rewarding" (p. 336). Sherry's version of media flow theory postulated that game enjoyment can be explained by the balance between individual differences in cognitive abilities and challenges presented by media messages.

### *Identifying Fun Factors from Game Reviews*

Taken together, a significant number of scholars have provided theoretical reasoning and empirical evidence from a user's perspective that help understand the core of game enjoyment. However, this so-called uses and gratifications approach is often limited by the eloquence and insightfulness of the research participants. The implicit assumption that individuals are able to report their true motivations for media selection is questionable. The same applies to individuals reporting not only if, but why a game play experience was fun.

We adopted a unique strategy to overcome these limitations. In using elaborative justifications of enjoyment in the form of regularly published professional game reviews, we still designed our study from a user's perspective, but that of an expert user. Our assumptions are that professional game reviewers are experts who have a broad subject matter knowledge background as well as a diverse gaming experience. When writing reviews of a game, they often draw upon their prior knowledge and experience in making their judgment less idiosyncratic. Moreover, they make explicit arguments about their subjective play experiences in deliberative written evaluations. Therefore, the goal of this study was to identify fun factors of digital games articulated by professional game reviewers.

We conducted a content analysis of 60 game reviews retrieved from two highly credible sources. Results of our analyses rendered a total of 27 fun-factor-related content categories as well as their relative importance based on their weighted frequencies and valence in reviewer comments. The rest of this chapter summarizes and discusses general patterns among these identified fun factors and their implications for serious games.

## Methods

### *Data Retrieval and Sampling*

Players often go to popular Web sites to learn about newly released digital games. In fact, many professional game magazines also provide free game reviews on their Web sites. *GamePro* is one of the most popular professional game magazines published monthly in the United States, with its readership reaching almost 4 million in 2007 (Integrated Media Network, 2007). The game reviews in the magazine are also published on their Web site: GamePro.com. For both the magazine and the Web site, reviewed games are rated on a 5-point scale with fractional increments of 0.25. A newly released game is often given three specific fun factor ratings on graphics, sound, and control, and an additional overall fun factor rating. A game is placed in the Editor's Choice category if it receives an overall fun factor score of 4.50 or above. The site also provides an average critic score for each game based on expert ratings from other popular game magazines and Web sites. Given its prominent focus on fun factors, GamePro.com was chosen to be our primary data source.

IGN.com is another popular source of news and reviews on entertainment games, although it exists solely online. Formerly known as Imagine Games Network, the Web site was launched in 1996 and later became a unit of Fox Interactive Media owned by News Corporation. IGN.com provides comprehensive reviews of newly released games with five specific scores on presentation, graphics, sound, game play, and lasting appeal, and an overall IGN rating score, all on a 10-point scale. Similar to the average critic score on GamePro.com, this site also provides an average press rating for each game based on

evaluations from other sources. To reduce the bias of a single source of game reviews and a limited number of in-house reviewers, IGN.com was selected as a complimentary data source in this study.

On both Web sites, game reviews are usually organized by game-playing platforms. The 10 most commonly listed game platforms are: PlayStation 2 (PS2), PlayStation 3 (PS3), Xbox, Xbox 360, Wii, GameCube, PlayStation Portable (PSP), DS, Game Boy Advance (GBA), and PC. For each of the 10 platforms the most recent 15 reviews by the end of January 2007 were retrieved from GamePro.com to create a primary data pool. Each review was assigned a unique identification number, such as 001.1, with the first three digits representing a particular game and the extension representing the source of database (i.e., .1 as from GamePro.com and .2 as from IGN.com). Then, three reviewed games on each platform were randomly sampled from the GamePro review data pool and retained when a review could also be retrieved from IGN.com for the same game. Thus, our final sample included 60 reviews for 30 games.

In terms of genre, 46.7% of our random sample was categorized by GamePro as action games, 20.0% were sports games, 13.3% were role playing games (RPGs), 6.7% were adventure games, 6.7% were simulations, and 6.7% were strategy games. In terms of ratings by the Entertainment Software Rating Board, 44.4% were rated as for "Teens," 22.2% for "Everyone," 22.2% for "Everyone 10+," and 11.1% for "Mature 17+." For all games reviewed we also obtained additional data on rating scores and sales ranking. From GamePro.com and IGN.com we compiled overall rating by their own experts, specific ratings focusing on different game play enjoyment dimensions by their own experts (appropriately delineated), and average ratings of other popular game Web sites. The games in our sample were rated by GamePro.com with overall fun factor ratings between 1.50 and 5.00, with a mean of 3.69. Amazon.com, a major American e-commerce company that often sells digital games, listed the sample's respective sales ranks as ranging from 140th to 5,366th with the smaller number indicating a higher sales rank. The average ranking of all games in the sample was 1,287th. For consistency, all sampled reviews were reformatted to contain only textual content with no graphics.

### *Coding Procedures*

The coding schemes were created using both inductive and deductive approaches. Four experienced game players were asked to independently construct a list of commonsense fun factor categories. In addition, literature on game enjoyment was systematically reviewed to identify important fun factors suggested in previous studies and theoretical elaborations (detailed in previous literature review section). Initial coding schemes were pilot tested using a small sample of reviews and modified for final coding according to the following 30 identified content categories (see Table 3.1). The final coding scheme was applied to the text in each review.

*Table 3.1* Content Categories, Definitions, and Examples

| *Content Category* | *Definition* | *Example* |
|---|---|---|
| 1. Overall Technological Capacity | General comments on the technological aspect of a game. | "*Liberation* makes great use of the PSP hardware and its capabilities – all of them – to establish its place as one of the best games on the system" [Review 068.2]. |
| 2. Usability | The functionality and stability of a game, such as loading time, frame rate, bugs, or navigability of menus. | "… we encountered bugs in flag activation…a couple of missions … stopped working mid-way for no reason" [Review 008.2]. |
| 3. Control | The ease, intuitiveness, and effectiveness of controls. | "On the field, the controls are sharp and swift" [Review 076.1]. |
| 4. Interactivity | The continuous action-and-reaction loops between the player(s) and the game world. | "Part of what makes it so rewarding is … how easily you interact with everything" [Review 068.2]. |
| 5. Artificial Intelligence | The design of and interaction with artificial intelligence in a game. | "Doing more to hamper the gameplay is the enemy A.I." [Review 097.2]. |
| 6. Overall Game Design | General comments on game design. | "While there was a lot to love about the original *Empire at War*, there were some design decisions that left many gamers, including us, feeling a little dissatisfied. Petroglyph seems to have taken all of those criticisms to heart and improved on nearly every single aspect of the game" [Review 084.2]. |
| 7. Novelty | The originality or innovativeness of a game, such as incorporating new ideas in a compelling manner versus rehashing old concepts. | "…when it comes to tricking, *Tony Hawk's Downhill Jam* is … a different experience from the traditional game" [Review 030.2]. |
| 8. Mechanics | The degree to which the basic game rules and core activities are well-established and enjoyable. | "Perhaps the most entertaining aspects of *Summon Night*'s gameplay is the battle system" [Review 041.1]. |
| 9. Complexity and Diversity | The quantity and quality of meaningful options presented to the player and how well those options build on each other to enable a deep and intriguing game-play experience. | "As the game progresses, more job classes are unlocked, creating more opportunities to determine what the best team combination is for each area" [Review 037.1]. |
| 10. Levels | The ability of game level designs to provide efficient structures to enhance the overall game play experience. | "If nothing else, a more sensible minimum level standard should have been adopted for each area of the game" [Review 062.2]. |

*(continued)*

*Table 3.1* Continued

| *Content Category* | *Definition* | *Example* |
|---|---|---|
| 11. Challenge | The difficulty of a game and whether it is scaled to provide a balanced experience that is neither frustrating nor effortless for the player(s). | "The downside is that missions are either much easier or much more difficult depending on how many balls you have at the start" [Review 094.2]. |
| 12. Freedom | The degree to which the structure of a game allows players to pursue different courses of action at will. | "How you go about the game is entirely up to you, and the game allows for class switching at any time" [Review 037.2]. |
| 13. Gratification | When game elements provide players with a sense of reward upon completion of tasks. | "Included in the trick attack mode is the ability to grab double and triple point modifiers, which instantly add a ton of points to the trick total" [Review 030.2]. |
| 14. Overall Aesthetic Presentation | General comments on aesthetic presentation, such as visual look, sound effects, and style. | "The overall style is pretty solid" [Review 030.2]. |
| 15. Visual Presentation | The quality of the graphics in the game. | "The game has some of the finest graphics seen on the PS2" [Review 001.1]. |
| 16. Audio Presentation | The quality of music, sound effects, and voice acting. | "The worst offender is the song selection; it's a veritable cornucopia of musical variety" [Review 036.1]. |
| 17. Overall Entertainment Game Play Experience | General comments on the experience of entertainment during game play. | "…fun rhythm gameplay, in which you essentially tap markers that go along with the music" [Review 036.1]. |
| 18. Excitement | The pacing of a game and sensory pleasure and arousal experienced by the player. | "Giddy with excitement, I cranked up with the classic. Minutes later, I turned it off in anger" [Review 015.2]. |
| 19. Presence | The degree to which player(s) experience the virtual physical objects, virtual social actors, and virtual self generated by media technologies as if they were real. | "*Rogue Galaxy* is what every RPG should strive to be: an immersive experience that places you in a new world" [Review 001.1]. |
| 20. Social Interaction | The possibility, requirement, and quality of human interactions during game play, especially regarding multiplayer support / features. | "…this is one of the most addictive multiplayer titles … With two or more people, it is transformed into one of those games that you just can't stop playing" [Review 076.2]. |

*(continued)*

*Table 3.1* Continued

| *Content Category* | *Definition* | *Example* |
|---|---|---|
| 21. Length | Whether the game allows for a sufficient duration of play before it is beaten. | "…that stays fun for about an hour at most" [Review 017.2]. |
| 22. Replayability | Whether players want to play a game multiple times. | "There is not much point in running through it again" [Review 085.2]. |
| 23. Storyline | The existence and quality of storylines and plots in a game. | "*Bully* has a seriously poignant story with great dialogue" [Review 008.2]. |
| 24. Characters | The attractiveness, identifiability/relatablity, customizability, and depth of characters in a game. | "The biggest draw of this game is the goofy characters" [Review 017.2]. |
| 25. Humor | The use and effectiveness of humor in a game. | "The real joy of playing *Sam and Max* is in watching the hilarious interactions unfold and in spotting the throwaway jokes hidden in magazine racks and picture frames" [Review 085.2]. |
| 26. Realness | How a game resembles environments, situations, and social interactions in the physical world. | "*FFIII* has a more realistic feel" [Review 037.2]. |
| 27. Fantasy | Whether a game provides players with a fantastical and imaginative experience that is normally impossible in real life. | "I only wish that the writers had been willing to go just one step further and bring a little more absurdity into the whole thing. While the talking dog and rabbit thing are odd enough, everything else in the game seems just one shade too sane for you to totally lose yourself in the experience" [Review 085.2]. |
| 28. Other General Comments | Recommendations to the gamers and general comments about a game that don't explain what specifically makes the game fun to play. | "*Bully* is an interesting game" [Review 008.2]. |
| 29. Pure Descriptions | Pure descriptions of what is or what is not in a particular game. | "*Pocketbike Racer* has five tracks to choose from that range from short loops to longer jump and ramp filled course. Each course is filled with gates that fill up your power gauge when you cross through them …" [Review 017.2]. |
| 30. Irrelevant Content | Background information, general discussions about games or gaming that is not pertinent to the specific game under review. | "Burger King is offering three games for the low, low price of only four dollars with the purchase of a value meal" [Review 017.1]. |